

## TIPS AND TRICKS TO A CRUCIATE TEAR DIAGNOSIS AND A SURGEONS THOUGHTS ON STIFLE BRACES

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### Key Points:

- Cranial cruciate ligament disease is a common cause of hind limb lameness in the dog
- While the diagnosis may at times seem straight forward, it is not always so simple
- It is important to understand how to determine the severity of the tear
- Stifle orthotics may play a role in the conservative management of cranial cruciate ligament ruptures
- When discussing stifle orthotics it is important to discuss the tolerability, osteoarthritis progression, meniscal tearing, and expectations

Cranial cruciate ligament (CCL) rupture is one of the most common orthopedic conditions encountered in the dog. In fact, over 1 billion US dollars are spent every year in dealing with the canine stifle. When dealing with hind limb lameness many dogs we see have some degree of hip dysplasia or degenerative changes in the hip; however, an acute lameness is typically not due to a hip problem. In fact, 32% of dogs referred for hip problems actually have evidence of cruciate disease. About 33-50% of dogs will present with bilateral disease even if they have a unilateral lameness. Severe bilateral cruciate disease can often mimic other conditions such as severe hip dysplasia or neurologic disease. Therefore, a general rule of thumb is a hind limb lameness in a dog is cruciate disease until proven otherwise.

It's important to remember that CCL tearing is very different in the dog when compared to human ACL tearing. In **humans the ACL** tears due to trauma (**supraphysiologic load to a normal ligament**) where in the **dog the CCL** breaks down due to degeneration so tearing is part of a disease process (**physiologic load to an abnormal ligament**).

### Diagnosis:

The diagnosis can appear straightforward, but that is not always the case. Commonly it is based off the history, signalment, clinical signs, physical exam, and orthopedic exam. The history may include an acute or chronic hind limb lameness that may be mild to non-weight bearing. Interestingly, owners may report that the lameness has improved from initial injury. This usually corresponds to the timeframe from when the initial inflammatory response is ending.

Regarding the signalment any age or breed can be affected. Typically, we tend to see medium to large breed dogs that are around 3-8 years of age.

The orthopedic exam is mainstay to diagnosing a CCL rupture. Findings may include a positive sit test where the dog will tend to sit with the affected leg projecting out to the side. Pain on hyperextension is usually the forgotten test but is very reliable. Most affected dogs will exhibit some degree of pain. Crepitus may be noted during ROM, and with chronic tears medial buttress formation may be noted. This is the peri-articular

fibrosis that occurs. The classic findings for a CCL rupture are joint effusion, the cranial drawer test and the tibial compression test.

Regarding joint effusion one way to think about it, is that in an adult dog joint effusion will only be caused by a CCL rupture, septic arthritis, tick-borne disease, or immune-mediated arthritis. A medial patella luxation (MPL) will not cause the same degree of joint effusion, so if you have a patient with underlying MPL that develops worsening joint effusion be thinking about a CCL rupture.

The cranial drawer test is testing for laxity in the CCL, but this is more of a passive test and does not mimic weight bearing. To perform the test one hand is placed on the distal femur with the thumb behind the lateral condyle. The other hand is placed on the proximal tibia with the thumb behind the fabella. The goal is to move the proximal tibia cranially in relation to the femur. Always check drawer in flexion and extension. **When checking for partial tears the CCL has two bands, the craniomedial which remains taut in both flexion and extension and the caudolateral, which is taut in extension but lax in flexion.** For example, if the craniomedial band is torn and the caudolateral band is intact cranial drawer is only present in flexion because in extension the caudolateral band is taut. If the caudolateral band is torn and the craniomedial band is intact no cranial drawer is present because the craniomedial band is taut in both flexion and extension.

Cranial tibial thrust is a test meant to mimic active weight bearing. The goal is to hold the stifle at a standing angle (approximately 135 degrees) and while holding the stifle still flex the hock. If the CCL is ruptured there should be a cranial displacement of the tibia. As with cranial drawer, tibial thrust should be checked in both flexion and extension.

The ultimate “Dycus Guide to CCL Diagnosis”

<b>CCL Diagnosis</b>	<b>Examination Finding</b>
Normal	No tibial thrust or cranial drawer in extension, no joint effusion, no pain on hyperextension
Competent Partial CCL tear, aka “stable partial tear” (<50%)	No tibial thrust or cranial drawer in extension or flexion, effusion present, pain on hyperextension
Incompetent Partial CCL tear, aka “unstable partial tear” (50-75%)	No tibial thrust or cranial drawer in extension, positive cranial drawer in flexion
Complete CCL tear (75-100%)	Positive tibial thrust and cranial drawer in extension

\*\*Note the percentage tear is fully subjective to the authors experience

Radiographic evaluation will help to see evidence of joint effusion with cranial displacement of the intrapatellar fat pad. With chronic CCL ruptures you may see evidence of OA and if you are lucky the stifle is sitting in drawer on the radiographs. Some people have proposed a stable stifle with joint effusion and a hind limb lameness may be evidence of a partial tear.

## **Treatment:**

When deciding on a treatment plan there is no one treatment fits all, but there are many, many, many options available. The reason there are so many options is because not one procedure or medical management technique is 100% perfect. I think one reason for this is because what is considered our outcome, a stable stifle, a patient that returns to activity pain free, elimination of OA, owner satisfaction, etc.? We will never be content on cruciate disease until we figure out the goals we want to achieve for an outcome.

To treat patients conservatively I consider dog with partial tears, this means no instability, they may have effusion present, and pain on hyperextension of the stifle as potential candidate. Other candidates would be patients that are unfit for anesthesia. I don't consider patients that the owner does not want to proceed with surgery as candidates for conservative therapy. I do however have a very strong heart to heart conversation with them as setting expectations is very important early on.

Conservative management is typically more than doing nothing, it involves making the patient comfortable and improving pain initially. This is completed with pharmaceuticals, manual therapies (stretching, ROM, massage), icing, etc. Commonly, this will take 1-2 weeks to be effective. Once the patient is comfortable then we begin our rehabilitation management with the goals being to improve comfort, alter the development of peri-articular fibrosis, improve muscle mass, diminish compensatory issues, and return to activity. Exercise restriction will also be needed at home for a period of about 12+ weeks.

## **Stifle Orthotics**

In human medicine, knee braces are commonly used for multiple conditions. Bracing of the human knee has been shown to enhance proprioception/joint position sense, permit the injured limb to relax, reduce fatigue in injured limb, provides some mechanical protection against impact, and slow movement down to allow muscles time to react and control motion. Categories of knee braces in human medicine include the following: prophylactic (prevent or reduce severity of knee injuries in contact sports), functional (provide stability for unstable knee, rehabilitative (allow protected and controlled motion during the rehabilitation of injured knees), and patellofemoral (improve patellar tracking and relieve anterior pain). Only functional knee braces are utilized in veterinary medicine.

In theory the brace should help limit tibial subluxation. At the authors institution we did find improved objective gait analysis when a custom stifle brace was worn versus when not worn; however, the gait analysis was not improved equal to that of surgery.<sup>4</sup> This data reveals that a brace is not considered equal to or meant to replace surgery; furthermore, it must be worn for the duration of the pet's life. A recent retrospective revealed that 46% of dogs placed in a custom stifle orthotic will develop skin lesions and 32% of those require medical care for the lesions that develop. Furthermore, 37% only tolerated the brace "fairly", "did not wear it" or "did not tolerate it". When owners were asked why a stifle orthotic was chosen over surgery the answers were cost, convenience, personal preference, and **veterinarian recommendation**. This further reiterates the need

for veterinarians to have a full understanding of what a stifle orthotic can and can't accomplish.<sup>5</sup>

My conversation with owners regarding stifle orthotics is as follows:

1) Tolerability: I can't ask the patient if he/she will tolerate the brace, I have had some dogs that don't mind it at all, others take time, and some just freeze or try to chew it. The other issue is given the different shapes and sizes of dog stifles the brace MUST be custom made. This means a mold must be made and sent to the orthotist and then sent back about 2 weeks later. It's a horrible feeling to have an owner pay the expense for a brace and then the dog won't tolerate it.

2) Arthritic progress: What I can tell an owner is that with surgery we can slow down and minimize arthritic progression. Without surgery we will have continued accelerated and worsening progression OA. Along that scale is a brace; I just don't know if the scale is closer to that of surgery or that of no-surgery?

3) Meniscal damage: What I can tell an owner is that with surgery we can minimize the chances of a meniscal injury. Without surgery there is a high incidence of meniscal injury. The problem is again along that scale I don't know where a brace will fall. Will it help protect the meniscus the same as surgery, or will it not make a difference such as doing nothing? This does bring up a good point about meniscal damage. A "meniscal click" will only get you about 30-40% correct at identifying a meniscal injury. If you add in a positive McMurray test and pain on hyperflexion that may improve to about 50%. Personally, I feel as if a dog has a meniscal tear they will not benefit from a brace because it will do nothing to help with the pain and discomfort. The problem is if at best you can diagnose a meniscal injury in 50% of patients then how does one approach determining if there is meniscal injury? A MRI could be considered but is costly and requires general anesthesia, arthroscopy could be considered but personally would be below the standard of care to go to surgery to identify a meniscal injury but not treat the CCL rupture. Therefore, if I have owners that want their dog in a brace then they must undergo a stifle ultrasound. If there is evidence of meniscal damage then that dog will not be a good candidate for a brace, if they don't appear to have meniscal damage then we can give it a shot knowing that an ultrasound is not 100%.

At this point in time we really need more information about stifle braces such as kinetic and kinematic information and proper patient selection. What about meniscal injury, will a patient that has a meniscal tear at the time of dx have as good of an outcome as a patient without a meniscal tear? How do we increase our ability to diagnose a meniscal injury? Will a brace protect the meniscus from tearing? What about overweight patients, or patients with bilateral disease, what about patients with CCL/MPL combination? Also, what about OA progression?

Conservative management can be successful in patients, but I think patient selection is key. We need to move away from the thought process of letting the stifle scar down and move more towards a process of controlling pain and altering periarticular fibrosis to allow the normal compensatory mechanism to be more effective. A stifle

orthotic may play a role in conservative management with certain pros and cons that need to be addressed. However, simply offering a brace as a cheaper alternative to surgery is not what they were designed to be used for.

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